UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Northwest Region
7600 Sand Point Way N.E., Bldg. 1
BIN C15700
Seattle, WA 98115-0070

June 13, 2003

Robert Macy
Bureau of Indian Affairs
911 NE Eleventh Ave
Portland, Oregon 97232-4169

Re: Endangered Species Act Section 7 Formal Consultation and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation for the Lummi Shore Road Stabilization Project. (NMFS Tracking No.:2002/00487)

Dear Mr. Macy:

The attached document transmits the NOAA's National Marine Fisheries Service's (NOAA Fisheries) Biological Opinion (Opinion) on the proposed Lummi Shore Road Stabilization Project in accordance with section 7 of the Endangered Species Act of 1973, as amended (16 USC 1531). The Bureau of Indian Affairs (BIA) determined that the proposed action was likely to adversely affect the Puget Sound (PS) chinook (*Oncorhynchus tshawytscha*) Evolutionarily Significant Unit.

This Opinion reflects formal consultation and an analysis of effects covering the PS chinook in the Hale Passage and Bellingham Bay, Whatcom County, Washington. The Opinion is based on information provided in the biological assessment sent to NOAA Fisheries by the BIA and Lummi Nation, as well as subsequent information transmitted by telephone conversations and electronic mail. A complete administrative record of this consultation is on file at the Washington Habitat Branch Office.

NOAA Fisheries concludes that the implementation of the proposed project is not likely to jeopardize the continued existence of PS chinook. Please note that the incidental take statement, which includes reasonable and prudent measures and terms and conditions, was designed to minimize take. If you have any questions, please contact Barbara Wood of the Washington Habitat Branch Office at (360) 534-9307 or barb.wood@noaa.gov.

Sincerely,

F.r Michael R Course

D. Robert Lohn
Regional Administrator

Enclosure

Endangered Species Act - Section 7 Consultation
Biological Opinion
And
Magnuson-Stevens Fisheries Conservation and Management Act
Essential Fish Habitat Consultation

Lummi Shore Road Stabilization Project,
Whatcom County

WHB-02-176
NMFS Tracking No.: 2002/00487

Agency: U.S. Department of Interior
Bureau of Indian Affairs

Consultation Conducted By: National Marine Fisheries Service,
Northwest Region

Approved by: for Michael R Crouse Date: June 13, 2003

D. Robert Lohn
Regional Administrator

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1.0 INTRODUCTION

This document transmits the NOAA's National Marine Fisheries Services' (NOAA Fisheries) Biological Opinion (Opinion) and Magnuson-Stevens Fisheries Conservation and Management Act (MSA) consultation based on our review of the proposed Lummi View Drive and Lummi Shore Road, Phase II project, located in Whatcom County, Washington. The proposed project for road improvements and shoreline stabilization project is located along Hale Passage and Bellingham Bay. These areas are within the Puget Sound (PS) chinook (*Oncorhynchus tshawytscha*) evolutionary significant unit (ESU). Hale Passage and Bellingham Bay are also Essential Fish Habitat (EFH) for chinook, coho (*O. kisutch*), and PS pink (*O. gorbuscha*) salmon.

1.1 Background and Consultation History

The proposed project is Phase II of the Lummi Shore Road Restoration and Shore Protection Project. A National Environmental Policy Act (NEPA) Environmental Assessment was completed in 1996 by the Lummi Indian Business Council, US Army Corps of Engineers (COE), US Department of Interior, Bureau of Indian Affairs (BIA), Federal Highway Administration (FHWA), Washington State Department of Transportation (WSDOT), and Whatcom County Department of Public Works. Phase II includes additional construction and shoreline stabilization along Bellingham Bay and Hale Passage. Phase I of the project was completed by the COE in 1998, and included approximately 2.3 miles of shoreline armoring along Bellingham Bay to protect Lummi Shore Drive from natural coastal erosion. As part of Phase II of the project, the BIA proposes to fund the stabilization of 700 feet of Lummi View Drive along Hale Passage, realign and widen approximately 0.6 miles of Lummi View Drive, and stabilize approximately 1,200 feet of Lummi Shore Road adjacent to Bellingham Bay. To comply with the Endangered Species Act (ESA) 7(a)(2), the BIA requested section 7 formal consultation, and the Lummi Nation has submitted the Biological Assessment (BA) and other related information through the BIA.

This document is based on information provided in the BA, additional information, and the following written correspondence: NOAA Fisheries received a BA dated December 10, 1999 that included actions on Lummi Shore Road and Lummi View Drive. However, construction of shoreline hardening along approximately 2.3 miles of the Lummi Shore Road shoreline and approximately 100 to 150 feet of shoreline hardening along Lummi View Drive was completed in December 1999, and therefore not included in this consultation. On March 1, 2000, NOAA Fisheries sent a letter of non-concurrence on the "may affect, not likely to adversely affect" on Phase II (Lummi Shore Drive) to Federal Highway Administration (FHWA). On March 7, 2000, a letter was received from FWHA requesting formal consultation for both phases of the project. On April 3, 2000, NOAA Fisheries sent a letter to WSDOT stating that NOAA Fisheries will consult on the remaining construction of Phase I as an informal consultation, and the proposed work for Phase II as a separate consultation. NOAA Fisheries disagreed with the "may affect, not likely to adversely affect"on Phase II of the project. The April 3, 2000 letter also served as the informal consultation for Phase I of the project. On July 10, 2002, NOAA Fisheries received an e-mail from FHWA withdrawing their involvement as the lead Federal agency for the project,

and identified the BIA as the new lead agency. On September 19, 2000, NOAA Fisheries received a revised project design from the Lummi Nation. On December 18, 2002, a letter from the BIA was received requesting formal consultation for Phase II. On February 14, 2003, NOAA Fisheries sent a letter to the BIA and the Lummi Tribe requesting additional information.

Additionally, telephone conversations, meetings, e-mail correspondence, and site visits between staff of NOAA Fisheries, United States Fish and Wildlife Service (FWS), WSDOT, the Lummi Nation, and BIA are documented in the administrative record.

1.2 Description of the Proposed Action

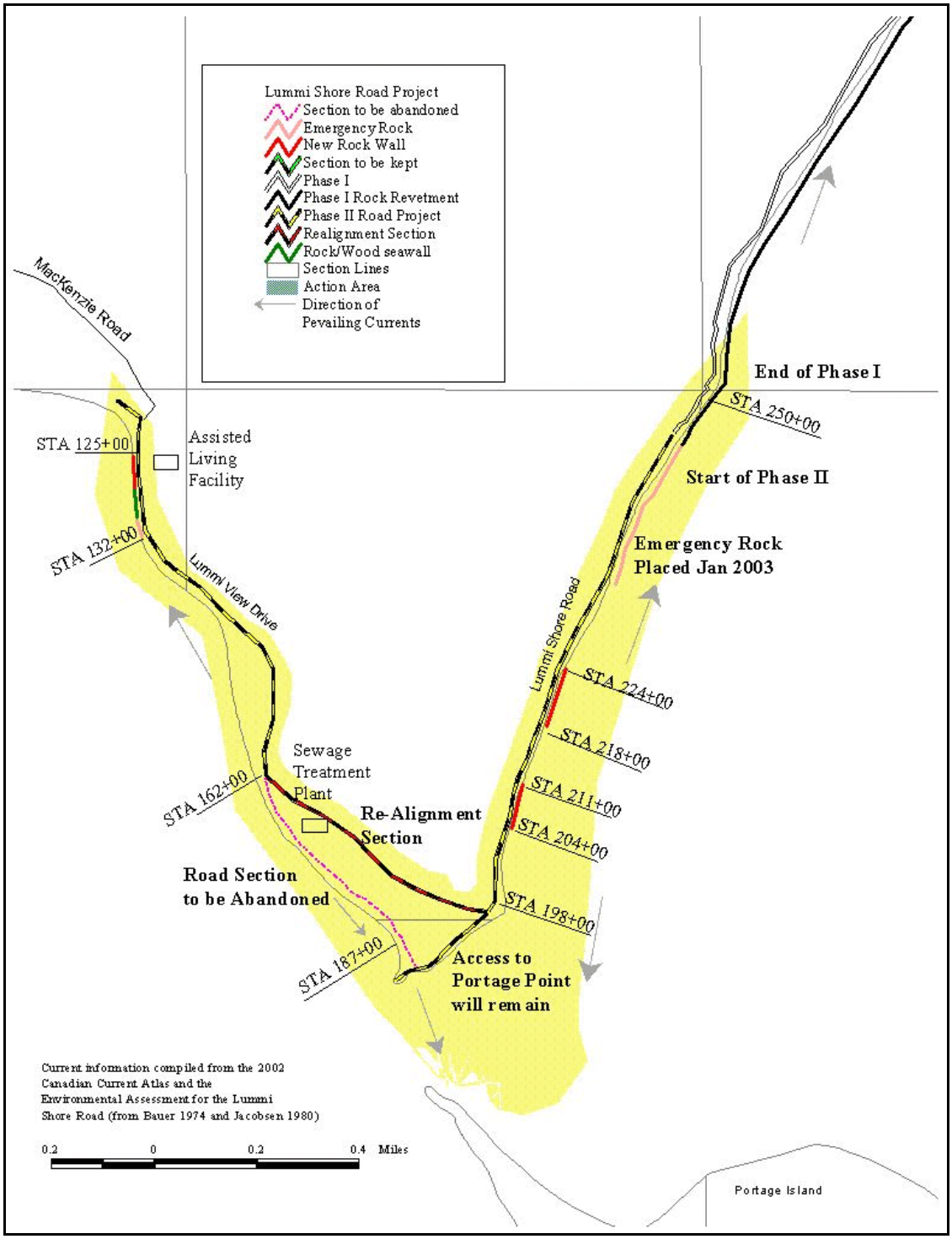
The BIA proposes to fund and design, in whole or in part, a project to be constructed by the Lummi Indian Nation and Whatcom County. The project is a cooperative effort between the BIA, the Lummi Nation, and the Whatcom County Roads Department. Figure 1 depicts the project and action area.

The proposed work includes:

- Widen 0.6 mile of Lummi View Drive from 20 feet to 34 feet.
- Relocate a 3,000 foot section of Lummi View Drive approximately 0.1 mile inland.
- Install structural fill higher than10 feet above Mean Lower Low Water (MLLW) over approximately 1,200 feet of bluff at three sections along Bellingham Bay.
- Install shoreline armoring higher than 9 feet above MLLW along approximately 700 feet of shoreline along three sections of Hale Passage.
- Install stormwater treatment facilities.
- Abandonment of the section of Lummi Shore Drive along the Hale Passage shoreline.
- Placement of large woody debris (LWD) along the shoreline of Hale Passage.

Construction would begin in the summer of 2003. Construction of the shoreline armoring along Hale Passage would take approximately 2 to 3 weeks. Construction for the re-alignment section and shoulder stabilization work along Bellingham Bay will take approximately two months. The following is a brief description of the proposed construction activities.

Figure 1. Map of Project and Action Area



1.2.1 Removal of Vegetation and Stormwater Control Construction

Most of the construction work will occur within 300 feet of marine waters of Bellingham Bay or Hale Passage, except for the 3,000 linear foot road to be relocated approximately 0.1 mile inland section of Lummi View Drive.

Construction of approximately 0.6 miles of new road and widening of approximately 0.8 miles of Lummi View Drive will require clearing approximately 3.7 acres of vegetation and add approximately 4.2 acres of new impervious surface.

The existing impervious surface in the project area is approximately 4.2 acres, and there is no water quality or quantity treatment. The project will use temporary stormwater Best Management Practices (BMP) during construction activities. The project proposed will construct new stormwater treatment facilities for the permanent impervious surface and will be constructed to address the effects of new and existing impervious surface. Permanent stormwater treatment will include bioswales approximately 2 feet deep by 10 feet wide positioned along side the road. These facilities will provide water quality treatment before infiltrating or discharging into the receiving waters of Puget Sound.

The abandoned portion of Lummi View Drive will remain in place until funding becomes available to relocate existing utilities that are adjacent to the abandoned road. Upon full abandonment of the road, the impervious surface will be removed and the area scarified. The area will then be restored by planting native vegetation.

1.2.2 Armoring of the Marine Shoreline (Hale Passage)

Approximately 700 feet of new rock seawall will be installed along two undisturbed areas of shoreline along Lummi View Drive (Hale Passage). In addition, LWD will be installed at the toe of the slope between the two rocked areas. Construction will require approximately 30 native deciduous and evergreen trees ranging from 6 to 24 inches in diameter be removed at two sections of Lummi View Drive. The sections of the seawall will be placed at an elevation of approximately 9 feet above MLLW.

The new shoreline hardening along Hale Passage will be a mixture of rock and LWD, placed as high up on the beach as possible to minimize impacts to potential forage fish spawning beaches, but also low enough to avoid the removal of existing vegetation along the shoreline. The toe of the structure will be buried approximately two feet deep and extend seaward about three feet to prevent undermining of the seawall by wave and tidal action. Approximately 150 linear feet of rock that was placed in the winter of 1998 for emergency repair, and that has naturally moved down into the zone of higher productivity will be placed higher up the beach as far as practicable.

1.2.3 Armoring of the Marine Shoreline (Bellingham Bay)

To protect the shoulder of Lummi Shore Road, approximately 1,200 linear feet of rock will be placed in three sections along Bellingham Bay. The majority of this work will occur above the existing revetment at 10 feet above MLLW elevation to protect the newly repaired and widened roadway along Bellingham Bay. In January 2003, a winter storm eroded four unprotected sections of the southern end of Lummi Shore Road. The area also includes approximately 885 feet of rock that was placed along the Bellingham Bay and Portage Point shoreline during an emergency action by the Whatcom County Public Works in 2003.

1.2.4 Rehabilitation of Bellingham Bay Shoreline

The BIA will rehabilitate the shoreline vegetation along Phase II areas along Hale Passage with the addition of native shrub and tree species. In addition to replanting the shoreline, the BIA will place gravel over the hardened shoreline (riprap), along all areas that are lower than 9 feet above MLLW, to provide substrate for natural fauna, and prevent opportunities for marine predators to hide at high tides.

1.3 Interrelated and Interdependent Actions

Effects of the action are analyzed together with the effects of other activities that are interrelated to, or interdependent with the proposed action. An interrelated action is one that is part of the proposed action, or depends on the proposed action for its justification. An interdependent action is one that has no independent utility apart from the proposed action (50 CFR 402.02).

In addition to the shoreline armoring and re-construction work associated with the proposed action, the following interrelated and interdependent actions will occur: (1) protection of existing utility infrastructure, and (2) beach nourishment, shoreline re-vegetation, and monitoring.

The section of roadway closest to the shoreline is located within 0.5 miles of the sewer treatment facility. Because the sewer line will remain in place, there is a risk of potential damage to the pipe in the event of an earthquake, high winter storms that overtop the revetment, or erosional damage along the natural sections of shoreline. The shoreline will likely require protection until such utilities are relocated. Conversely, the environmental damage caused by a line rupture close to the receiving facility would cause significant water quality impacts at the point source. Discharge of raw sewage onto the beach would also impact forage fish spawning beaches and eelgrass communities within the extent of the littoral drift zone.

Additional structures or facilities that are likely to be installed as part of the proposed action include power poles and electrical lines, culverts, drainage facilities such as ditches and infiltration or bio-swales, road shoulders and pullouts, guardrails, and lighting at intersections. Water quality concerns from runoff will be minimized using the BMP relating to construction and new impervious surfaces.

The section of roadway along Portage Point that will be realigned inland will be totally abandoned and restored following the relocation of utilities along the new alignment. However, until funding is secured, approximately 6,172 feet of road along Hale Passage remains at risk from erosion. Approximately 3,702 feet along Bellingham Bay remains at risk, as illustrated during the January 2003 storm which caused damage to the road and required approximately 292 linear feet of rock higher than 10 feet above MLLW to stabilize the road prism. Future removal of the pavement, and scarifying the area will partially restore permeability to the surface, thus providing some infiltration of stormwater and improving water quality.

1.4 The Action Area

The action area is defined as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR 402.02). The action area is defined to mean "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action."

The action area for the Lummi Shore Road/Lummi View Drive Project includes the existing road and new alignment section, utilities and right-of-way corridors, drainage systems, and equipment storage areas, as well as the shoreline and marine environment starting at the edge of the road and extending into the marine environment that is affected by near-shore currents. Based on an analysis of the prevailing currents, the action area includes the shallow intertidal zone extending from approximately 0.7 miles northeast of Portage Point and continuing around the tip of the Peninsula to Fisherman's Cove (see Figure 1).

2.0 ENDANGERED SPECIES ACT

2.1 Status of Species and Habitat

NOAA Fisheries completed a status review of chinook salmon from Washington, Idaho, Oregon, and California in 1998, which identified fifteen distinct ESU species of chinook salmon in the region (Myers *et al.* 1998). After assessing information concerning chinook salmon abundance, distribution, population trends, risks, and protection efforts, NOAA Fisheries determined that chinook salmon in the Puget Sound ESU are at risk of becoming endangered in the foreseeable future. Subsequently, NOAA Fisheries listed Puget Sound chinook salmon as threatened (March 24, 1999, 64 FR 14308). Prohibitions against take were applied later (July 10, 2000, 65 FR 42422).

The Puget Sound ESU is a complex of many individual populations of naturally spawning chinook salmon, and 38 hatchery populations (March 24, 1999, 64 FR 14308,). Through the recovery planning process, NOAA Fisheries will define how many and which naturally spawning populations of chinook salmon are necessary for the recovery of the ESU as a whole (McElhany *et al.* 2000). Recently, NOAA Fisheries' Puget Sound Technical Recovery Team (PSTRT 2001) tentatively identified 21 geographically distinct populations of chinook salmon in Puget Sound, including two in the Nooksack River.

In most streams within Puget Sound, both short- and long-term trends in chinook salmon abundance are declining. Overall abundance of chinook salmon in this ESU has declined substantially from historical levels and many populations are small enough that genetic and demographic risks are likely to be relatively high. Factors contributing to the downward trend include widespread migratory blockages and degradation of freshwater and marine habitat, with the upper watershed widely affected by poor forestry practices and the mid- and lower-watershed affected by agriculture and urbanization. Spring- and summer-run chinook salmon populations through the Puget Sound ESU have been particularly affected. These life histories have exhibited widespread declines throughout the ESU and some runs are believed extirpated (Nehlsen *et al.* 1991; March 24, 1999, 64 FR 14308). These losses represent a significant reduction in the life history diversity of this ESU (March 24, 1999, 64 FR 14308).

2.2 Evaluating the Proposed Action

The standards for determining jeopardy are set forth in section 7(a)(2) of the ESA as defined by 50 CFR Part 402 (the consultation regulations). NOAA Fisheries must determine whether the action is likely to jeopardize the listed species and/or whether the action is likely to destroy or adversely modify critical habitat. This analysis involves the initial steps of (1) defining the biological requirements and current status of the listed species, and (2) evaluating the relevance of the environmental baseline to the species' current status.

Subsequently, NOAA Fisheries evaluates whether the action is likely to jeopardize the listed species by determining if the species can be expected to survive with an adequate potential for recovery. In making this determination, NOAA Fisheries must consider the estimated level of mortality attributable to: (1) collective effects of the proposed or continuing action, (2) the environmental baseline, and (3) any cumulative effects. This evaluation must take into account measures for survival and recovery specific to the listed salmon's life stages that occur beyond the action area. If NOAA Fisheries finds that the action is likely to jeopardize, NOAA Fisheries must identify reasonable and prudent alternatives for the action.

For the proposed action, NOAA Fisheries' jeopardy analysis considers direct or indirect mortality of fish attributable to the action. NOAA Fisheries' jeopardy analysis also considers the extent to which the proposed action affects the quantity and quality of salmonid habitat by assessing the functions of essential elements necessary for migration, spawning, and rearing of the listed salmon under the existing environmental baseline.

The potential effects of the proposed action on PS chinook salmon were evaluated based on (1) the biological requirements of PS chinook salmon, (2) the present environmental baseline conditions of the action area that include shallow intertidal zone extending from approximately 0.7 miles northeast of Portage Point and continuing around the tip of the peninsula to Fisherman's Cove, (3) the likely direct and indirect effects of the proposed project on habitat, and PS chinook biological requirements, and (4) the cumulative effects of the environmental baseline and the proposed project on the likelihood of PS chinook survival. The analysis was based on a review and synthesis of the best available scientific information. Specific sources are listed in the bibliography and cited throughout the body of the document. Primary sources of

information included the BA for the proposed project, and communications between Lummi Nation, BIA, NOAA Fisheries, and USFWS.

2.2.1 Biological Requirements

The relevant biological requirements are those necessary for PS chinook to survive and recover to naturally reproducing population levels at which time protection under the ESA would become unnecessary. Adequate population levels must safeguard the genetic diversity of the listed stock, enhance their capacity to adapt to various environmental conditions, and allow them to become self-sustaining in the natural environment.

Biological requirements are considered habitat conditions that are relevant to any chinook life stage. These habitat elements include water quality, shoreline vegetation, and nearshore habitat for PS chinook, as well as their forage species.

Information related to biological requirements for PS chinook can be found in Spence *et al*. 1996. Presently, the biological requirements of listed species are not being met under the environmental baseline. The biological requirements affected by the proposed action include the alteration of migrating and rearing habitat, as well as forage species spawning habitat, through the removal of shoreline vegetation and the armoring of shoreline along Hale Passage and Bellingham Bay.

2.2.2 Status of the Species within the Action Area

The action area provides migration and foraging for PS chinook, and spawning habitat for chinook forage species i.e., herring, surf smelt, and sand lance. The Nooksack River is the primary source of freshwater in the action area. The Nooksack River has two distinct natural spawning spring chinook stocks in the North Fork and South Fork, and an introduced summer/fall run of Green River lineage. The two spring PS chinook stocks are genetically distinct from each other, as well as the 19 other Puget Sound stocks. The stocks have differentiated because of the unique characteristics of the two watersheds. The North Fork is a higher elevation glacier fed stream; the South Fork is a lower elevation stream that receives no glacier melt. The South Fork is therefore generally low and clear during spawning. Adaption to these diverse water flow patterns reinforces the biological isolation of these stocks despite their proximity. There is apparently little straying between the two as indicated by the very few out-of-basin coded-wire tag (CWT) recoveries. Because of the unique characteristics of these stocks, both are considered important to the overall health and recovery of PS chinook (Washington State Department of Fish and Wildlife, PSTT 2002).

Significant differences occur in the life history, of these two stocks. The North Fork and South Fork stocks differ in spawn timing. The average date of peak redd count for the South Fork averaged late September, while the peak for the North Fork is in early September. Peak catches of chinook fry occurred earlier in the North Fork than in the South Fork (Wunderlich, Meyer, and Boomer 1982 as cited in WDFW and PSTT 2002). The two Nooksack stocks also differ in juvenile out-migration strategies. Based on limited data, approximately 95% of the natural-

origin North Fork adults out migrated as subyearlings in their first year. In contrast, in the South Fork, 55% to 67% of the adults had yearling scale patterns, which indicate a significant component of this stock remained in the river for over a full year before migrating to saltwater (Marshall *et al.* 1995).

In a 1995 Lummi Shore Beach Seine study, Bellingham Bay and Hale Passage shorelines were surveyed for nearshore use by fishes (Ballinger 1996). Chinook smolts were taken in beach seine studies from March through September, although only yearlings were observed prior to May. The greatest relative abundance for chinook smolts was in June and July. The highest concentration of chinook were observed at Portage Point, which is in the project area.

Both stocks are depressed because of low spawning in recent years. The South Fork in particular is likely critical. Over the last five years the escapements to the North Fork and South Fork have averaged 354 (range 45 to 621) and 190 (range 118 to 290), respectively compared to interim escapement goals of 1,000 each. The North Fork and South Fork have been substantially degraded largely because of more than a century of watershed development and manipulations of the floodplain and channel, including agricultural practices, timber harvest, and associated road building activities. Improvements in habitat quality are considered essential to recovery (NMFS 2001).

2.2.3 Environmental Baseline

The environmental baseline represents the current set of basal conditions to which the effects of the proposed action are then added. Environmental baseline is defined as "the past and present impacts of all Federal, state, and private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or informal section 7 consultation, and the impact of state or private actions which are contemporaneous with the consultation process" (50 CFR 402.02).

The Puget Sound Basin has been subjected to at least four distinct glacial advances (Burns 1985). The last advance went as far south as the hills between Olympia (southern end of Puget Sound) and the Chehalis River. After retreating, the glaciers left an enormous amount of material behind. The majority of land surrounding Puget Sound is composed of glacial deposits (Burns 1985). Much of the eastern shore of Puget Sound are characterized by steep bluffs composed of glacial till. Under natural conditions where the banks are not armored, material sloughs off via landslides caused by gravity, high pore pressures, wave action and erosion, bringing material ranging in size from boulders to clay sized particles, entire trees, and other vegetation to the beaches (Komar 1997). The construction of roads, rail lines, residences, utility corridors, and other infrastructure adjacent to the shoreline requires measures to protect them from natural shoreline erosion and thus disconnects this natural shoreline process.

Recent studies have found that approximately 30% of the shoreline in the state has been armored, with approximately 1.7 miles of Puget Sound shoreline being armored each year (WDNR 2001; Canning and Shipman 1995b). Up to 80% of the eastern shore of central Puget Sound has been modified (WDNR 2000). In areas with armored shoreline, natural beach

nourishment materials are only delivered to the intertidal zone by very large landslides where the material is recruited over or through public infrastructure. In these areas, the intertidal zone has been starved of fine grained material, resulting in a conversion from gently sloping sandy beaches to steeper cobble and hard bottom shorelines. Furthermore, the presence of armored shoreline promotes greater erosion of the shoreline by deflecting wave energy, resulting in the lowering and steepening of the shoreline. The result is a decrease in shallow nearshore habitat which is highly productive for juvenile lifestages of PS chinook.

The Nooksack estuary, and the shoreline of Bellingham Bay and Hale Passage are habitat for PS chinook. The PS chinook are known to utilize the Nooksack River system and pass through the estuary both as adults to spawn on the upper reaches and outmigrate as smolts. Returning adults utilize deeper water and may use the shorelines as they travel. Juvenile chinook utilize near-shore marine habitats and associated shallow areas. Within the action area, PS chinook salmon smolts occur along the nearshore primarily between March and September. Chinook juvenile peaks occur in May, June, and July, and are primarily of hatchery origin (Mike McKay, Lummi Fisheries, as cited in Biological Assessment Report, Eissinger 1999).

In addition to providing habitat to PS chinook, the marine shorelines and intertidal areas of the action area support spawning populations of Pacific herring (*Clupea harengus pallasi*), surf smelt (*Hypomesus pretiosus*), and sand lance (*Ammodytes hexapterus*) (WDFW 2000). In synchrony with the peaks of outmigrating chinook, is the herring and surf smelt spawning along the Lummi Peninsula shoreline. All three are forage species for PS chinook. The majority of the spawning by sand lance and surf smelt in the action area occurs from the tidal flats of Portage Point northeast along Bellingham Bay. While substrate conditions appear to be ideal along the beaches of Hale Passage, and sand lance spawn along this shoreline, no surf smelt eggs have been found to date below Lummi View Drive. Pacific herring may spawn in the spring, in the eelgrass beds directly offshore along the entire shoreline of the action area.

2.2.4 Factors Affecting the Species Within the Action Area

The Nooksack River is the main river system that drains into Bellingham Bay. Historically, a side channel of the Nooksack River flowed directly into Lummi Bay. Because high flows in this channel caused flooding in low-lying areas and reduced the flows in the mainstem, the channel was diked in the late 1800's, effectively directing the entire flow into Bellingham Bay. Most of the salmon spawning habitat is located in the three forks of the Nooksack River. However, much of the area has considerable sedimentation problems, because of intense logging in the upper watershed and agricultural practices in the lower watershed (Smith 2002). The Environmental Analysis (EA) Report (1996) *Lummi Shore Road Restoration and Shore Protection Project* states that, as a consequence of the altered hydrology of the river, the current estuary is of relatively recent construction. As the delta naturally accretes and builds into the bay, the southeastern edge of the Lummi Peninsula has been experiencing areas of sediment deposition and shoreline erosion.

Adjacent to the action area, Berry *et al*. (2001) reports that approximately 83% of the northern shoreline of Bellingham Bay has been armored, most of it associated with the city of Bellingham

and the installation of the 2.3 mile rock revetment under Phase I of the project. The rock revetment that was installed in 1998 resulted in a net loss of approximately 30% of the natural shoreline remaining in 1998 in Bellingham Bay. Approximately 75% of Sammish Bay, 72% of Sandy Point, and 64% of Lummi Bay have been modified with bulkheads, revetments, and other armoring projects, including the Lummi shellfish aqua-culture sea pond (Berry *et al.* 2001). In contrast, the shorelines adjacent to, and including, the Nooksack River Delta, Portage Island, Hale Passage, and most of Lummi Island are currently unaltered natural shorelines. Because the natural stretches of shoreline are interspersed with armored sections, it is difficult to evaluate the cumulative effects of shoreline modifications on the intertidal habitats and coastal processes.

In 1995, Schwartz conducted baseline ecological studies which investigated the natural systems and intertidal erosional processes prior to implementation of the Lummi Shore Drive and Lummi View Road project. Schwartz found that the prevailing littoral drift of entrained material along the Bellingham Bay side of the Lummi Peninsula is primarily in a northeasterly direction, towards the Nooksack River Delta, while the net shore drift along Hermosa Beach (southeastern edge of the peninsula) is to the southwest. Shannon and Wilson (1994) documented an apparent split in the drift along Hale Passage near the Stommish Grounds, while Schwartz (1995) describes the net shore drift to be to the northwest, from Portage Point to Gooseberry Point.

Schwartz also found that erosional processes are most pronounced along Bellingham Bay while the shoreline along Hale Passage appears to be eroding at a much slower rate. Estimated erosional rates for both the Lummi Shore Road and the Lummi View Drive segments of this project indicate that the shoreline south of Smokehouse Road along Bellingham Bay lost 32 feet between 1966 and 1994, or 14 inches per year, while the feeder bluffs between the Portage and the Stommish Grounds along Hale Passage receded approximately 17 feet between 1943 and 1994, for an average of four inches per year. Schwartz estimates that approximately 1,000 cubic yards of material are contributed annually to the drift cell northerly towards Gooseberry Point by the erosion of shoreline along Hale Passage between Portage Point and the Stommish Grounds.

The marine shorelines and intertidal areas of the action area support spawning populations of Pacific herring, surf smelt, and sand lance (WDFW 2000). The majority of the spawning use by sand lance and surf smelt in the project area occurs from the tidal flats of Portage Point northeast along Bellingham Bay. While substrate conditions appear to be ideal along the beaches of Hale Passage and sand lance spawn along this shoreline, no surf smelt eggs have been found to date below Lummi View Drive. Herring use the eelgrass beds just offshore along the entire shoreline of the project area.

Natural erosion and sediment routing maintain functional conditions for forage fish spawning habitat and are presumed to maintain productive conditions for juvenile chinook. The potential loss of nearshore marine environment, such as low gradient shallow areas for rearing juvenile chinook, and natural erosion of shoreline materials for forage fish spawning habitat, further reduces critical marine shoreline required for the recovery of PS chinook.

Because much of the shoreline is developed with fixed structures (roads, houses, etc.), the baseline condition of the nearshore marine environment of Bellingham Bay is considered

degraded.

2.3 Analysis of Effects

In this analysis, the changes resulting from the proposed action are expressed in terms of whether it is likely to restore, maintain, or degrade an element of functional chinook salmon habitat. By examining the effects of the proposed action on the habitat portion of a species biological requirements, NOAA Fisheries can gauge how the action will affect the population variables that constitute the rest of a species' biological requirements and finally, the effect of the action on the species (NMFS 1999).

In this analysis, the probable direct and indirect effects of the action on the chinook salmon are identified. The ESA implementing regulations direct NOAA Fisheries to do so "together with the effects of other activities that are interrelated or interdependent with that action, that will be added to the environmental baseline (50 CFR 402.02)."

Direct effects include the effects of constructing the rock retaining wall along Hale Passage requiring the removal of approximately 30 trees ranging in size from 6 to 24 inches in diameter along the two sections of shoreline that will be stabilized along Lummi View Road. The removal of trees along some sections and placement of the rock revetment will permanently prevent the establishment of mature shoreline vegetation in the future.

The indirect effects analysis considers the need for future beach nourishment through the placement of material along the hardened shoreline. The proposed project will cut off feeder bluffs and armor portions of the natural shorelines of Bellingham Bay and Hale Passage, thus permanently adversely affecting natural beach-forming processes, including spawning beaches for surf smelt and sand lance which are important forage species.

Although shoreline revetments can be effective at slowing down erosional processes, they have a limited life expectancy and require maintenance. Currently, there is a COE permit that approves regular maintenance of the existing riprap and road. It is expected that long-term effects of the existing rock revetments will necessitate additional shoreline protection measures and road repairs in areas that are currently natural shoreline bluff. Damage to the revetments from earthquakes, severe storms, and natural erosion may require emergency actions that would include adding more rock and/or repairing damaged sections. These actions will continue to prevent natural processes from functioning properly and will maintain much of the Lummi Peninsula shoreline in a degraded condition.

2.3.1 Direct Effects

Direct effects are the immediate effects of the project on the species or its habitat. Future Federal actions that are not a direct effect of the action under consideration (and not included in the environmental baseline or treated as indirect effects) are not evaluated.

Direct effects to the shoreline along Hale Passage include loss of shoreline vegetation during

road widening, and placement of shoreline armoring riprap. The work includes: (1) the removal of shoreline vegetation to construct a 700-foot seawall along Hale Passage; and (2) placement of 150 feet cubic yards of riprap along Bellingham Bay. Mechanisms for these impacts include physical disturbance of the shoreline area during removal of trees and construction of the 700-foot seawall. In addition, there will be permanent alteration of approximately 1,900 linear feet of natural shoreline and approximately 700 linear feet of riparian vegetation, and changes in shoreline sediment drift patterns. The construction work is expected to occur in daylight hours at low tide.

Water Quality

The construction activities include the placement of rock and LWD along Hale Passage and Bellingham Bay. Placement of structures along the shoreline can mobilize sediments that can increase turbidity. Therefore, short-term effects from the proposed action include an increase in sedimentation and turbidity associated with the placement of the armoring materials immediately at the project site. The proposed action includes the use of construction BMPs and timing limitations to minimize these effects.

Increased sedimentation and turbidity might impact the migration of juvenile salmonids along the altered shoreline. Sand lance or surf smelt eggs or larvae that may be in the sand at the time of construction might be harmed by increased sedimentation, or by the operation of heavy equipment on the beach.

Overall, sedimentation and turbidity are likely to be avoided by limiting all in-water activities to the marine timing windows, restricting operations of equipment on the beach to low tide, and using wide track/low pressure equipment. Overall, the increased turbidity and potential fine sediment deposition are not expected to measurably affect PS chinook, or their forage species during construction.

Shoreline Condition

Construction of the rock retaining wall along Hale Passage will require the removal of approximately 30 trees ranging in size from 8 to 24 inches in diameter along the two sections of shoreline that will be stabilized along Lummi View Road. Mature trees serve a vital ecological function, including providing overhead cover, bank stability and shade, and contributing fine organic materials, insect, and large woody material to the nearshore marine environment.

The permanent removal of approximately 700 linear feet of riparian will reduce shade, allochthonous inputs, and LWD recruitment, which are necessary components for a properly functioning nearshore shoreline. Shoreline armoring will permanently prevent the establishment of mature shoreline vegetation in the future that can be recruited to the marine environment. Recruitment of LWD and beach nourishment materials supply habitat elements for migrating and rearing salmonids, and spawning forage fish species.

However, to offset loss of riparian, the BIA proposes to incorporate as much LWD as practicable

into the bank stabilization construction project. In addition, the BIA proposes to revegetate all disturbed areas with native grasses, shrubs, and trees.

2.3.2 Indirect Effects

Indirect effects are those effects that are caused by or will result from the proposed action and are later in time, but are still reasonably certain to occur (50 CFR 402.02). Indirect effects might occur outside of the area directly affected by the action. Indirect effects might include other actions that have not undergone section 7 consultation, but will result from the action under consideration. These actions must be reasonably certain to occur, or they are a logical extension of the proposed action.

Impervious Surface and Stormwater Facilities

New construction in the action area will include the removal of approximately 3.7 acres of vegetation and a net increase of approximately 4.2 acres of impervious surface (roads and sidewalks). The removal of vegetative cover and the placement of permanent impervious surface in a watershed is related to several environmental effects that can adversely affect aquatic species such as salmon. To address these issues, the proposed action includes methods of stormwater treatment.

The extent to which chinook detect adverse effects associated with impervious surfaces depends on several factors, e.g., the amount and location of land conversion, the vegetative condition of riparian or shoreline, and the BMPs implemented to offset any new impervious surface. To offset potential effects of land clearing and new impervious surface, the BIA will abandon or vacate approximately 2.8 acres of existing road, and construct temporary and permanent water quality treatment facilities.

As more native vegetation is removed and natural landscape is converted to impervious surface, changes in water quality and hydrology become more apparent on habitat. Stormwater treatment facilities, in addition to other minimization measures, can reduce those changes in water quality and quantity if they are designed and implemented properly. In addition to proper design, all stormwater BMPs and facilities must be regularly maintained to assure proper operation to avoid and minimize impacts to receiving waters that provide habitat for salmonids.

The proposed project incorporates measures to minimize changes in hydrology caused by the new impervious surface built under the proposed action. These measures provide for both stormwater quality treatment and infiltration following quality treatment. These measures include creating stormwater treatment facilities designed to detain and treat stormwater transmitted from the road improvement project prior to discharge into marine waters. Detention basins will provide some infiltration where precipitation will percolate stormwater to groundwater. On balance, the expected effects of added impervious surface and stormwater treatment to fish habitat in the action area will be minimized through re-vegetation with native plants where feasible, and the use of permanent stormwater BMPs.

Net Shore Sediment Transport and Shoreline Morphology

Under the proposed action, approximately 700 feet of shoreline along Hale Passage will be armored higher than 9 feet above MLLW elevation. Another 1,200 feet along Bellingham Bay will be armored higher than 10 feet above MLLW elevation to protect the newly repaired and widened roadway along Bellingham Bay. Both elevations are above the mean high high water (MHHW), and the placement of rock along Bellingham Bay will not involve the removal of native vegetation and will occur above the existing revetments. Phase II will impact sheltered, low bank shorelines along Bellingham Bay and relatively stable moderately high banks along Hale Passage. In entirety, Phase II will result in the stabilization of an additional approximately 1,900 linear feet (0.36 miles) of shoreline and will impact approximately five percent of the natural shoreline along Hale Passage.

A section of roadway along the shoreline will be abandoned or vacated as a result of realigning a portion of Lummi View Drive inland. This section will be downgraded to an access drive that will serve three private residences and provide beach access to the tideflats at Portage Point. The remaining road will be completely removed and another part will be converted back to gravel. However, there is no set date for the relocation of utilities located in the road right-of-way. Because the utilities, including a sewer line, will likely remain in place at the site where the road will be moved inland, there remains a potential for the area to require additional armoring because of potential damage in the event of an earthquake, high winter storms that overtop the revetment, or erosional damage along the natural sections of shoreline. However, the environmental damage caused by a line rupture close to the receiving facility would cause significant water quality effects in the area of the rupture. Discharge of raw sewage onto the beach would also impact spawning beaches and eelgrass communities within the extent of the littoral drift zone. Removal of the pavement and re-vegetation of the abandoned or vacated in the future will restore permeability to the impervious surface, thus providing water quality treatment and infiltration of stormwater.

The beach nourishment program (Phase I by the COE) does not extend to the area being armored along Lummi View Drive. Construction of Phase II might have long-term adverse effects on the beach elevations and forage fish spawning beaches along Hale Passage. The prevailing drift along Hale Passage is to the northwest (Schwartz 1995). The project is located near the distal end of the northwest drift cell and is in a location where the drift patterns indicate an apparent seasonal split. Therefore, it is possible that the effects of the armoring could remain relatively localized within Hale Passage. Given the drift patterns in the area, the shoreline armoring along Hale Passage is more likely to affect the contribution and movement of material north rather than to the south, toward Portage Point.

Most of the material that has been placed along Bellingham Bay under the beach nourishment program has remained within the nourishment cells (Johannessen 2002). This is largely because the nourishment cells are bordered at each end with truck dumping ramps that are functioning like rock barbs (extending perpendicular to the beach and inhibiting lateral transport of material). Placed material collects against the next northerly truck ramp, and therefore is restricted from movement further towards Portage Point where the additional armoring is being placed.

Monitoring of the physical and biological effects of the beach nourishment program to date indicates no net loss of forage fish spawning habitat since 1999. However, the beaches have lowered approximately three feet from pre-construction levels, and are continuing to drop in elevation at a rate of approximately one-half-foot per year, and are steepening. Thus, while it appears that the beach nourishment program is helping to maintain forage fish spawning areas, the data indicate that the mitigation efforts will need to be continued, and possibly enhanced to sustain substrate quality and beach elevations.

Spawner surveys of forage fish showed an overall reduction in surf smelt eggs in the seining grounds, an increase in egg production along the central shore, and relatively constant levels of egg production along the Smokehouse reach. While the results indicate that the beach nourishment program is maintaining spawning habitat, the spawning patches are smaller and correlated with the accumulation areas against the truck ramps. The main improvement was seen in the northern areas and on the upper portions of the beaches. This is reasonable, given that the data indicate that the beaches are lowering and steepening. The sampling effort was not consistent over the years and many other variables also affect these data, including climate and weather conditions, observer subjectivity, and the effectiveness of the beach nourishment program.

Some impacts of the bluff protection on spawning beaches will be reduced with the current engineering design that restricts the armor rock to as high up on the beach as possible, sloping the structure, and embedding a wide toe and base into the substrates to minimize the risk of toe erosion. In a report prepared by Canning and Shipman in 1995, they concluded that "structures located high on the beach may have minimal impact on the beach." However, they went on to state that "severe impacts may still occur with hydraulic actions associated with the high storm and tide events that are currently causing the bluffs to erode."

Without the beach nourishment program, the shoreline armoring likely will result in a decline in spawning habitat for surf smelt and sand lance. It is currently not known how long the Lummi Tribe will be able to continue the beach nourishment program. At this time, it appears that environmental conditions together with supplementation are maintaining the spawning beaches. However, the program has only been implemented for four years, during which the area experienced mild winter weather conditions. Climatologists predict that we may be entering another El Niño cycle, which typically results in warmer weather patterns in the Pacific Northwest for a few years. The effects of milder winter weather patterns include less severe winter storms and an increased likelihood of rain-on-snow flood events. The net result of this weather cycle could result in increased delta-formation at the mouth of the Nooksack River and less shoreline erosion. With a shift back towards La Nina, more severe winter storms would be expected to reveal the need for beach supplementation.

Studies conducted by the WDFW to evaluate the effectiveness of mitigation efforts and attempts to restore beaches by artificial supplementation in other areas of the state have had mixed results. Long-term monitoring has shown that supplemented materials are often unstable and prone to lateral transport. Because of the mixed results, large scale mitigation is currently considered an unproven technique. However, the extent of the shoreline modifications associated with this

project (Phase II) and interim monitoring results of Phase I warrants continued commitment to the beach nourishment and monitoring program indefinitely. The beach nourishment program should be re-evaluated if long-term monitoring results indicate that artificial supplementation may be impacting other resources (such as eelgrass) or is found to be ineffective.

2.4 Cumulative Effects

Cumulative effects are defined as "those effects of future state or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation" (50 CFR 402.02). Future Federal actions that are unrelated to the proposed action are not considered in this section because they might require separate consultation pursuant to section 7 of the ESA.

The Lummi Peninsula has experienced a significant increase in development in the last several years. New construction includes a new tribal school, new assisted living facility, tribal housing, and the recent completion of a new casino. While these tribal actions are part of the environmental baseline, they demonstrate an ongoing trend of potential future actions that are dependent on road access. Because the Lummi Shore Road and Lummi View Drive provide the primary access route to the southern end of the Peninsula and most of these facilities, traffic and dependence on the road will increase.

Growth and development can degrade suitable habitat through the conversion of natural, functional habitat space to urban, residential, industrial, commercial, or agricultural uses. For example, although numerous impacts were avoided in these projects and unavoidable impacts mitigated, construction of the new school, tribal housing, assisted living facility, casino and associated parking lots, resulted in the loss or conversion of 75 acres of forested uplands and approximately 15 acres of wetlands. Growth and development also lead to an increased need for support facilities, including power generating facilities, irrigation and water diversions, access roads, and utilities. Plans are currently being developed to provide overnight accommodations for casino customers and housing facilities for students attending the Northwest Indian College. With increased use associated with these future developments, additional facilities upgrades may include expanding the community sewer, water, and public transportation systems, and improving services and public safety.

The project EA also indicates that public and commercial use near the ferry dock will continue and is likely to expand. Docks and piers that are in need of repair will likely be upgraded to meet current and future use standards. Increased use and accessibility to the peninsula and Lummi Island may result in increased development along the project corridor and at Gooseberry Point. Direct effects associated with the construction of these facilities include loss of shoreline functions, upland habitats, wetlands, open areas, and potential additional destruction of terrestrial or coastline habitats to protect new infrastructure and ensure public safety.

Additional shoreline armoring projects are also likely to occur to protect new facilities and private residences, further contributing to the cumulative loss of natural erosional processes. New and existing housing developments along the Sandy Point Spit near the project area in the

northwestern part of the reservation are currently and will continue to result in degradations to the natural shoreline processes from armoring projects, marinas, golf courses and other infrastructures related to growth and development. All of these actions are likely to impact habitat for aquatic species. NOAA Fisheries assumes that future state and private actions will continue into the future at similar intensities as has been occurring in the Bellingham area for the past several years.

2.5 Conclusion

The proposed action is not likely to jeopardize the continued existence of PS chinook. The determination of no jeopardy was based on the following:

- The installation of stormwater facilities will minimize the potential adverse effects of water quality effects due to new impervious surface along Hale Passage and Bellingham Bay shoreline.

- The cutting of approximately 700 feet of shoreline vegetation eliminates a substantial percentage of the potential recruitment for LWD along that section of shoreline. However, the project includes utilization of the removed trees at the project site, and replanting of native vegetation in project areas. These minimization measures will attempt to offset the loss of juvenile rearing edge habitat and compensate for LWD potential lost as a result of the project.

- The BIA will compensate for unavoidable effects to the shoreline for the shoreline armoring through the utilization of LWD in the armoring design. This includes removing the trees in such a matter to preserve the integrity of the root wad for use in the design of stabilization.

- The BIA will compensate for unavoidable effects to the shoreline through the placement of natural material over the rock to provide substrate for forage species and prevent opportunities of predators to hide when the rock wall will be submerged during high tides.

- Annual and daily timing restrictions are expected to minimize potential harm of forage fish and PS chinook.

The proposed action will impact approximately 1,900 linear feet of shoreline and feeder bluffs along the Lummi Peninsula, including the removal of approximately 30 shoreline trees. The 700-foot long shoreline stabilization along Lummi View Drive will consist of repairs to the 150 foot rock work installed in 1998 and the addition of approximately 550 feet of new rock seawall. Although the 1,200 feet of planned rock work along Lummi Shore Road will occur largely above existing revetments, it will stabilize most of the remaining bluffs between the revetment and the roadway. Because the revetments are designed to prevent erosion, the proposed action will adversely affect natural shoreline processes over the long-term and will contribute to the cumulative adverse effects of shoreline armoring in Puget Sound.

2.6 Reinitiation of Consultation

Consultation must be reinitiated if the amount or extent of taking specified in the Incidental Take Statement is exceeded, or is expected to be exceeded; new information reveals effects of the action may affect listed species in a way not previously considered; the action is modified in a way that causes an effect on listed species that was not previously considered; or, a new species is listed or habitat is designated that may be affected by the action (50 CFR 402.16).

2.7 Incidental Take Statement

Section 9 of the ESA and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species without special exemption. "Take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. Harm is further defined as significant habitat modification or degradation that actually kills or injures to listed species by "significantly impairing behavioral patterns such as breeding, spawning, rearing, migrating, feeding, and sheltering" (50 CFR 222.102). Incidental take is take of listed animal species that results from, but is not the purpose of, the Federal agency or the applicant carrying out an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to, and not intended as part of, the agency action is not considered prohibited taking provided that such takings is in compliance with the terms and conditions of this incidental take statement.

An incidental take statement specifies the effects of any incidental taking of endangered or threatened species. It also provides reasonable and prudent measures that are necessary to minimize take and sets forth terms and conditions with which the action agency must comply to implement the reasonable and prudent measures.

2.7.1 Amount or Extent of Take Anticipated

As stated in Section 2.2.2, above, PS chinook use the action area for migration and foraging. Puget Sound chinook are likely to be present in the action area during part of the year such that they would likely encounter the effects of the proposed action. Therefore, incidental take of PS chinook is reasonably certain to occur. The proposed action includes measures to reduce the likelihood and amount of incidental take. To ensure the action agency carries out these measures, take minimization measures included as part of the proposed action are restated in the Terms and Conditions provided below.

Take caused by the proposed action is likely in the form of harm, where habitat modification will impair normal behavioral patterns of listed salmonids. Here, the ability of Puget Sound chinook to use the area to forage will be diminished by the extent to which production of forage species is affected. The amount of take from this diminution is difficult, if not impossible to estimate. In instances where the number of individual animals to be taken cannot be reasonably estimated, NOAA Fisheries characterizes the amount as "unquantifiable" and uses a habitat surrogate to assess the extent of take. The surrogate provides an obvious threshold of anticipated take which, if exceeded, provides a basis for reinitiating consultation.

This Opinion analyzes the extent of effects that would result from loss or decreased function of

beaches that produce foraging opportunities for PS chinook. The extent of take NOAA Fisheries anticipates in this statement is that which would result from the installation of 1,900 linear feet (0.36 miles) of rock armoring, including the removal of shoreline vegetation along 700 feet of Hales Passage.

2.7.2 Reasonable and Prudent Measures

NOAA Fisheries believes that the following reasonable and prudent measures (RPM) are necessary and appropriate to minimize incidental take of PS chinook:

- RPM No. 1. The BIA shall minimize take by taking affirmative steps to avoid or minimize erosion and sediment delivery to water.

- RPM No. 2. The BIA shall minimize take from vegetation removal and additional impervious surface.

- RPM No. 3. The BIA shall minimize take from shoreline vegetation removal.

- RPM No. 4. The BIA shall minimize take from altered nearshore processes.

2.7.3 Terms and Conditions

To comply with ESA section 7 and be exempt from the prohibitions of ESA section 9, the BIA must comply with the terms and conditions that implement the reasonable and prudent measures. The terms and conditions are non-discretionary.

To implement RPM No. 1 above;

1. Mechanical equipment to be used on the beach shall be limited to wide tracked vehicles. Beach work, including rock placement and vegetation removal shall occur at low tide.

2. The allowable work window for marine waters in and around the Lummi Peninsula is restricted to the time period from July 15 through October 14. All activities within the inter-tidal zone shall be conducted out of the water during low tide and will be limited to this timing window.

To implement RPM No. 2 above;

1. Design criteria for the road realignment section shall meet or exceed current Washington Department of Ecology Stormwater Manual for Western Washington (2001) for the treatment of stormwater runoff.

2. To minimize impacts from suspended sediments and effects to aquatic marine organisms, construction of the rock revetment toe and low sections of the walls shall be conducted during low tide.

3. Prior to operating near the shoreline, all heavy equipment operating within 300 feet of any open water shall be checked on a daily basis for potential hydraulic leaks or other mechanical problems that could result in the accidental discharge of toxic materials. Any necessary repairs will avoid delivery of material to waters. A daily inspection log/checklist shall be maintained by the contractor.

4. Contractors shall prepare an approved spill prevention and response plan prior to construction. Spill cleanup materials and trained operators shall be available on site at all times during operation.

5. All exposed soil shall be promptly re-vegetated using a mixture of grass seed and native shrub plantings, within the next planting season.

To implement RPM No. 3 above;

1. To minimize impacts from vegetation removal and effects to aquatic marine organisms, construction of the rock revetment toe and low sections of the walls shall be conducted to minimize removal of native vegetation.

2. Drift logs and/or shoreline vegetation removed during construction shall be replaced following project implementation. Woody material shall be placed such that it provides similar ecological functions as it did prior to removal without impacting the project or causing damage to the shoreline that might necessitate future stabilization.

3. Mature trees removed from the new road alignment inland shall be utilized, where practicable, in the design of the shoreline armoring along Hale Passage.

4. The abandoned or vacated road adjacent to the shoreline will be rehabilitated by the removal of impervious surface, scarified, and re-vegetated with native plant species.

To implement RPM No. 4 above;

1. Prior to the installation of the rock seawall along Hale Passage, conduct transect measurements and surveys to determine the baseline condition of the shoreline. Measurements should be taken at the project locations as well as the area that may be affected by nearshore drift above and below the rock sites. Because eelgrass is sensitive to changes in drift patterns and associated sediment transport, the monitoring plan should evaluate long-term effects of both the loss of feeder bluffs and the supplementation program on the aquatic plant communities.

2. Drift logs and/or shoreline woody material removed during construction shall be replaced following project implementation. Woody material shall be placed such that it provides similar ecological functions as it did prior to removal without impacting the project or causing damage to the shoreline that might necessitate future stabilization.

3. If monitoring data indicate that forage fish spawning beaches along Hale Passage are eroding as a result of the project, a beach nourishment program shall be initiated to include affected areas along Lummi View Drive.

4. The BIA shall provide a project report to NOAA Fisheries describing the implementation of the associated terms and conditions and potential impacts to forage fish spawning beaches and PS chinook from the project (50 CFR 402.14(I)(3)). In addition to the project report, an annual monitoring report shall be submitted to the Washington Habitat Branch for a minimum of five years following project completion. The monitoring report shall list and describe:

   a. Beach nourishment, including locations, quantities, and quality of material placed;

   b. Sand lance and surf smelt spawning surveys and egg counts;

   c. Beach transect profiles and geological report, including summaries and recommendations; and

   d. Effectiveness of the terms and conditions.

3.0 MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT

3.1 Background

The MSA, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), established procedures designed to identify, conserve, and enhance EFH for those species regulated under a Federal fisheries management plan. Pursuant to the MSA:

- Federal agencies must consult with NOAA Fisheries on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH (§305(b)(2));

- NOAA Fisheries must provide conservation recommendations for any Federal or State action that would adversely affect EFH (§305(b)(4)(A));

- Federal agencies must provide a detailed response in writing to NOAA Fisheries within 30 days after receiving EFH conservation recommendations. The response must include a description of measures proposed by the agency for avoiding, mitigating, or offsetting the impact of the activity on EFH. In the case of a response that is inconsistent with NOAA Fisheries EFH conservation recommendations, the Federal agency must explain its reasons for not following the recommendations (§305(b)(4)(B)).

Essential Fish Habitat means those waters and substrate necessary to fish for spawning,

breeding, feeding, or growth to maturity (MSA §3). For the purpose of interpreting this definition of EFH: Waters include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate; substrate includes sediment, hard bottom, structures underlying the waters, and associated biological communities; necessary means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and "spawning, breeding, feeding, or growth to maturity" covers a species' full life cycle (50 CFR 600.10). Adverse effect means any impact which reduces quality and/or quantity of EFH, and may include direct (*e.g.*, contamination or physical disruption), indirect (*e.g.*, loss of forage or reduction in species fecundity), site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810).

Essential Fish Habitat consultation with NOAA Fisheries is required regarding any Federal agency action that may adversely affect EFH, including actions that occur outside EFH, such as certain upstream and upslope activities.

The objectives of this EFH consultation are to determine whether the proposed action would adversely affect designated EFH and to recommend conservation measures to avoid, minimize, or otherwise offset potential adverse effects to EFH.

3.2 Identification of EFH

Pursuant to the MSA, the Pacific Fisheries Management Council (PFMC) has designated EFH for Federally-managed fisheries within the waters of Washington, Oregon, and California. Designated EFH for groundfish and coastal pelagic species encompasses all waters from the mean high water line, and upriver extent of saltwater intrusion in river mouths, along the coasts of Washington, Oregon and California, seaward to the boundary of the U.S. exclusive economic zone (370.4 km)(PFMC 1998a, 1998b). Freshwater EFH for Pacific salmon includes all those streams, lakes, ponds, wetlands, and other water bodies currently, or historically accessible to salmon in Washington, Oregon, Idaho, and California, except areas upstream of certain impassable man-made barriers (as identified by the PFMC 1999), and longstanding, naturally-impassable barriers (i.e., natural waterfalls in existence for several hundred years) (PFMC 1999). In estuarine and marine areas, designated salmon EFH extends from the nearshore and tidal submerged environments within state territorial waters out to the full extent of the exclusive economic zone (370.4 km) offshore of Washington, Oregon, and California north of Point Conception to the Canadian border (PFMC 1999).

Detailed descriptions and identifications of EFH are contained in the fishery management plans for groundfish (PFMC 1998a), coastal pelagic species (PFMC 1998b), and Pacific salmon (PFMC 1999). Casillas et al. (1998) provides additional detail on the groundfish EFH habitat complexes. Assessment of the potential adverse effects to these species' EFH from the proposed action is based, in part, on these descriptions and on information provided by the BIA.

3.3 Proposed Actions

The proposed action and action area are detailed above in Section 1.2 and 1.4 of this document. The action area includes habitats that have been designated as EFH for various life-history stages of 46 species of groundfish, four coastal pelagic species, and three species of Pacific salmon (Table 1).

3.4 Effects of Proposed Action

As described in detail in Section 1.2 of this document, the proposed action may result in short- and long-term adverse effects to a variety of habitat parameters. These adverse effects are:

1. Short-term degradation of habitat because of removal of shoreline vegetation.

2. Long-term degradation because of shoreline armoring.

3.5 Conclusion

NOAA Fisheries concludes that the proposed action would adversely affect the EFH for the groundfish, coastal pelagic, and Pacific salmon species listed in Table 1.

3.6 EFH Conservation Recommendations

Pursuant to Section 305(b)(4)(A) of the MSA, NMFS is required to provide EFH conservation recommendations to Federal agencies regarding actions which may adversely affect EFH. NOAA Fisheries understands that the conservation measures described in the BA will be implemented by the FHWA, and believes that these measures are sufficient to minimize the short-term degradation of water quality (EFH Effect No. 6). However, NOAA Fisheries does not believe that
these conservation measures are sufficient to address the remainin adverse impacts to EFH described above. Consequently, NOAA Fisheries recommends that the BIA implement the following conservation measures to minimize the potential adverse effects to designated EFH for Pacific salmon (most of these recommendations also appear as Terms and Conditions in Section 2.7.3 of this document):

1. To offset the adverse effects of short-term degradation of habitat because of removal of shoreline vegetation, the following conservation measures are recommended;

    a. Mechanical equipment to be used on the beach should be limited to wide tracked vehicles. Beach work, including rock placement and vegetation removal should occur at low tide.

    b. Contractors should prepare an approved spill prevention and response plan prior to construction. Spill cleanup materials and trained operators should be available on site at all times during operation.

    c. All exposed soil should be promptly re-vegetated using a mixture of grass seed

and native shrub plantings, within the next planting season.

d. To minimize impacts from vegetation removal and effects to aquatic marine organisms, construction of the rock revetment toe and low sections of the walls should be conducted to minimize removal of native vegetation.

e. Drift logs and/or shoreline vegetation removed during construction should be replaced following project implementation. Woody material should be placed such that it provides similar ecological functions as it did prior to removal without impacting the project or causing damage to the shoreline that might necessitate future stabilization.

f. Mature trees removed from the new road alignment inland should be utilized, where practicable, in the design of the shoreline armoring along Hale Passage.

g. The abandoned or vacated road adjacent to the shoreline should be rehabilitated by the removal of impervious surface, scarified, and re-vegetated with native plant species.

2. To offset the adverse effects of short-term degradation of habitat because of removal of shoreline vegetation, the following conservation measures are recommended;

a. Prior to the installation of the rock seawall along Hale Passage, conduct transect measurements and surveys to determine the baseline condition of the shoreline. Measurements should be taken at the project locations as well as the area that may be affected by nearshore drift above and below the rock sites. Because eelgrass is sensitive to changes in drift patterns and associated sediment transport, the monitoring plan should evaluate long-term effects of both the loss of feeder bluffs and the supplementation program on the aquatic plant communities.

b. Drift logs and/or shoreline woody material removed during construction should be replaced following project implementation. Woody material should be placed such that it provides similar ecological functions as it did prior to removal without impacting the project or causing damage to the shoreline that might necessitate future stabilization.

c. If monitoring data indicate that forage fish spawning beaches along Hale Passage are eroding as a result of the project, a beach nourishment program should be initiated to include affected areas along Lummi View Drive.

3.7 Statutory Response Requirement

Pursuant to the MSA (§305(b)(4)(B)) and 50 CFR 600.920(k), Federal agencies are required to provide a detailed written response to NOAA Fisheries' EFH conservation recommendations

within 30 days of receipt of these recommendations. The response must include a description of measures proposed to avoid, mitigate, or offset the adverse impacts of the activity on EFH. In the case of a response that is inconsistent with the EFH conservation recommendations, the response must explain the reasons for not following the recommendations, including the scientific justification for any disagreements over the anticipated effects of the proposed action and the measures needed to avoid, minimize, mitigate, or offset such effects.

3.8 Supplemental Consultation

The BIA must reinitiate EFH consultation with NOAA Fisheries if the proposed action is substantially revised in a manner that may adversely affect EFH, or if new information becomes available that affects the basis for NOAA Fisheries' EFH conservation recommendations (50 CFR 600.920(l)).

Fish species with designated EFH in Puget Sound

Groundfish Species	redstripe rockfish *S. proriger*	Dover sole *Microstomus pacificus*
spiny dogfish *Squalus acanthias*	rosethorn rockfish *S. helvomaculatus*	English sole *Parophrys vetulus*
big skate *Raja binoculata*	rosy rockfish *S. rosaceus*	flathead sole *Hippoglossoides elassodon*
California skate *Raja inornata*	rougheye rockfish *S. aleutianus*	petrale sole *Eopsetta jordani*
longnose skate *Raja rhina*	sharpchin rockfish *S. zacentrus*	rex sole *Glyptocephalus zachirus*
ratfish *Hydrolagus colliei*	splitnose rockfish *S. diploproa*	rock sole *Lepidopsetta bilineata*
Pacific cod *Gadus macrocephalus*	striptail rockfish *S. saxicola*	sand sole *Psettichthys melanostictus*
Pacific whiting (hake) *Merluccius productus*	tiger rockfish *S. nigrocinctus*	starry flounder *Platichthys stellatus*
black rockfish *Sebastes melanops*	vermilion rockfish *S. miniatus*	arrowtooth flounder *Atheresthes stomias*
bocaccio *S. paucispinis*	yelloweye rockfish *S. ruberrimus*	
brown rockfish *S. auriculatus*	yellowtail rockfish *S. flavidus*	Coastal Pelagic Species
canary rockfish *S. pinniger*	shortspine thornyhead *Sebastolobus alascanus*	anchovy *Engraulis mordax*
China rockfish *S. nebulosus*	cabezon *Scorpaenichthys marmoratus*	Pacific sardine *Sardinops sagax*
copper rockfish *S. caurinus*	lingcod *Ophiodon elongatus*	Pacific mackerel *Scomber japonicus*
darkblotch rockfish *S. crameri*	kelp greenling *Hexagrammos decagrammus*	market squid Loligo opalescens
greenstriped rockfish *S. elongatus*	sablefish *Anoplopoma fimbria*	Pacific Salmon Species
Pacific ocean perch *S. alutus*	Pacific sanddab *Citharichthys sordidus*	chinook salmon *Oncorhychus tshawytscha*
quillback rockfish *S. maliger*	butter sole *Isopsetta isolepis*	coho salmon *O. kisutch*
redbanded rockfish *S. babcocki*	curlfin sole *Pleuronichthys decurrens*	Puget Sound pink salmon *O. gorbuscha*

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